

WHAT IS CLAIMED IS:

- 1 1. A method for forming at least one opening in a receptacle, the
2 method comprising:
3 providing a receptacle having a cover with an exterior surface and an
4 interior surface covering a cavity;
5 providing a cutting mechanism having at least one blade;
6 piercing the cover with the blade;
7 moving the blade through the cover to cut a portion of the cover and create
8 an opening in the cover and thereby provide access into the cavity, with the cut portion
9 being removed onto the exterior surface and away from the cavity as the opening is
10 created.
- 1 2. A method as in claim 1, further comprising rotating the cutting
2 mechanism after the piercing step to move the blade through the cover to provide an
3 elongate opening.
- 1 3. A method as in claim 2, wherein the cut portion curls on top of the
2 exterior surface upon rotation of the cutting mechanism.
- 1 4. A method as in claim 2, wherein the cutting mechanism includes
2 multiple blades such that multiple elongate openings are formed simultaneously when the
3 cutting mechanism is rotated.
- 1 5. A method as in claim 4, wherein the number of blades is three, and
2 further comprising rotating the cutting mechanism through an angle in the range from
3 about 70 degrees to about 115 degrees.
- 1 6. A method as in claim 1, wherein the cutting mechanism further
2 comprises a support member, and wherein the blade is angled in a forward direction
3 relative to the support member by an angle in the range from about 50 degrees to about 80
4 degrees, and further comprising moving the blade through the cover in the forward
5 direction.

1 7. A method as in claim 6, wherein the blade is angled in a forward
2 direction relative to the support member by an angle in the range from about 60 degrees
3 to about 70 degrees.

1 8. A method as in claim 1, wherein the cavity has an outer periphery,
2 and further comprising forming the opening near the outer periphery.

1 9. A method as in claim 8, wherein at least a portion of the outer
2 periphery is curved, and further comprising rotating the cutting mechanism such that the
3 opening is curved along the outer periphery.

1 10. A method as in claim 1, wherein the cutting mechanism further
2 includes a center cutting device, and further comprising forming a central opening in the
3 cover with the center cutting device while forming the opening.

1 11. A method as in claim 10, wherein the center cutting device
2 comprises a tubular member extending from a support member, and a plurality of blades
3 extending from the tubular member, and wherein the step of forming the central opening
4 comprises piercing the cover with the center cutting device and then rotating the support
5 member.

1 12. A method for aerosolizing a powder, the method comprising:
2 providing a receptacle having a cover with an exterior surface and an
3 interior surface covering a cavity that contains a powder;
4 providing a cutting mechanism having at least one outer blade and a
5 plurality of inner blades;
6 piercing the cover with the outer blade and the inner blades;
7 moving the outer blade through the cover to cut a portion of the cover and
8 to create an outer opening in the cover, with the cut portion being removed onto the
9 exterior surface and away from the cavity as the opening is created, and simultaneously
10 moving the inner blades through the cover to cut an inner opening in the cover; and
11 drawing air through the outer opening, through the cavity and out the inner
12 opening to extract the powder from the receptacle and to aerosolize the powder.

1 13. A method as in claim 12, wherein the cutting mechanism further
2 comprises a support member, and further comprising maintaining the support member
3 spaced apart from the cover when cutting the openings and when extracting the powder.

1 14. A method as in claim 13, wherein the outer opening has a width, B,
2 and further comprising maintaining the support member spaced apart from the cover by a
3 distance, A, where A is greater than or equal to B.

1 15. A method as in claim 14, wherein the width, B, is in the range from
2 about 0.3 mm to about 2 mm.

1 16. A method as in claim 12, further comprising a tubular member
2 extending from the support member, wherein the inner blades are formed on the tubular
3 member, and further comprising rotating the support member to create the outer and the
4 inner openings.

1 17. A method as in claim 16, wherein the drawing step comprises
2 flowing a gas stream through at least a portion of the tubular member.

1 18. A method as in claim 12, wherein the blade is angled in a forward
2 direction relative to the support member by an angle in the range from about 50 degrees
3 to about 80 degrees, and further comprising rotating the support member such that the
4 blade is moved through the cover in the forward direction.

1 19. A method as in claim 12, wherein the cavity has an outer periphery,
2 and further comprising forming the outer opening near the outer periphery.

1 20. A method as in claim 18, wherein the cutting mechanism includes
2 multiple blades such that multiple elongate openings are formed simultaneously about the
3 inner opening when the cutting mechanism is rotated.

1 21. A method for forming an opening in a receptacle, the method
2 comprising:
3 providing a receptacle having a cover with an exterior surface and an
4 interior surface covering a cavity;

5 providing a tubular body having a distal end with a plurality of inwardly
6 directed and outwardly facing blades;
7 piercing the cover with the blades;
8 rotating the tubular body to form an opening in the cover.

1 22. A hole forming device, comprising:
2 a support member;
3 a plurality of outer blades extending downward from the support member
4 at an angle in the range from about 50 degrees to about 80 degrees; and
5 a tubular member extending downward from the support member, with the
6 tubular member being surrounded by the outer blades, wherein a distal end of the tubular
7 member includes a plurality of inwardly directed and outwardly facing blades.

1 23. A device as in claim 22, wherein the outer blades have a width in
2 the range from about 0.3 mm to about 2-mm.

1 24. An aerosolizing apparatus comprising:
2 a housing that is adapted to receive a receptacle having a cover with an
3 exterior surface and an interior surface covering a cavity that contains a powder;
4 a hole forming device disposed within the housing, wherein the hole
5 forming device is adapted to form at least one inlet opening and an outlet opening in the
6 cover;
7 an aerosolizing system that is adapted to extract the powder from the
8 receptacle by drawing air through the inlet opening, through the receptacle and out the
9 outlet opening;
10 wherein the hole forming device comprises a support member having at
11 least one outer blade extending downward from the support member at an angle in the
12 range from about 50 degrees to about 80 degrees and at least one inner blade, and a
13 moving mechanism to move the support member relative to the receptacle to move the
14 outer blade through the cover and cause a cut portion of the cover to be removed onto the
15 exterior surface and away from the cavity to form an inlet opening, and to cut an outlet
16 opening with the inner blade.

1 25. An apparatus as in claim 24, wherein the hole forming device
2 further comprises a plurality of outer blades, and a tubular member extending downward

3 from the support member, with the tubular member being surrounded by the outer blades,
4 and wherein a distal end of the tubular member includes a plurality of inwardly directed
5 and outwardly facing blades inner blades.

1 26. An apparatus as in claim 25, wherein the outer blades have a width
2 in the range from about 0.3 mm to about 2 mm.

1 27. An apparatus as in claim 25, further comprising a gas source that is
2 configured to flow a gas stream through at least a portion of the tubular member to draw
3 gases through the inlet openings, through the cavity and through the tubular member.

1 28. An apparatus as in claim 25, further comprising a mouthpiece,
2 wherein suction on the mouthpiece causes a gas stream to flow through at least a portion
3 of the tubular member to draw gases through the inlet openings, through the cavity and
4 through the tubular member.

1 29. An aerosolizing system comprising:
2 at least one receptacle comprising a receptacle body having a cover with
3 an exterior surface and an interior surface covering a cavity that contains a powder;
4 an aerosolizing apparatus comprising a housing that is adapted to receive
5 the receptacle; a hole forming device disposed within the housing, wherein the hole
6 forming device is adapted to form at least one inlet opening and an outlet opening in the
7 cover; a gas flow system that is adapted to extract the powder from the receptacle by
8 drawing air through the inlet opening, through the receptacle and out the outlet opening;
9 wherein the hole forming device comprises a support member having at least one outer
10 blade extending downward from the support member at an angle in the range from about
11 50 degrees to about 80 degrees and at least one inner blade, and a moving mechanism to
12 move the support member relative to the receptacle to move the outer blade through the
13 cover and cause a cut portion of the cover to be removed onto the exterior surface and
14 away from the cavity to form an inlet opening, and to cut an outlet opening with the inner
15 blade.

1 30. A system as in claim 29, wherein the cavity has a circular outer
2 periphery, and further comprising a plurality of outer blades that are arranged to form a
3 plurality of inlet openings about the outer periphery to surround the outlet opening.

1 31. A system as in claim 30, wherein the hole forming device further
2 comprises a tubular member extending downward from the support member, with the
3 tubular member being surrounded by the outer blades, and wherein a distal end of the
4 tubular member includes a plurality of inwardly directed and outwardly facing blades
5 inner blades.

1 32. An apparatus as in claim 31, further comprising a gas source that is
2 configured to flow a gas stream through at least a portion of the tubular member to draw
3 gases through the inlet openings, through the cavity and through the tubular member.

1 33. An apparatus as in claim 31, further comprising a mouthpiece,
2 wherein suction on the mouthpiece causes a gas stream to flow through at least a portion
3 of the tubular member to draw gases through the inlet openings, through the cavity and
4 through the tubular member.